

Remarks

The examiner's reconsideration of the application is requested in view of the amendments above, comments which follow, and attachment hereto.

As requested by the examiner, Figure 11 has been amended to add appropriate legends, and is attached to this response. Approval is requested.

New claims 16 through 19 have been added, and are respectively identical to claims 15, 9, 10 and 11, but with different dependencies given the initial amendment made when filing of the application to remove multiple dependency.

The examiner has rejected claims 1 through 15 under 35 U.S.C. §103 as being unpatentable over U.S. Patent Number 6,407,548 to Dietz. Reconsideration is requested.

Claims 1 and 13 have been modified to recite more precisely the way the reciprocity method is applied. Basis can be found in Fig. 5 and the associated text.

The claims now recite that the wave vector is calculated in the direction from the body TO a reference point by placing an omnidirectional, monopole virtual source at the reference point and then using reciprocity.

The Examiner rejects claims 1-15 as being unpatentable over Dietz. The Applicants respectfully disagree with this view and have amended the independent claims to more clearly define the invention. Applicants submit that these amendments distinguish over Dietz and the rejection is therefore traversed.

Claim 1

The fundamental difference between the method of claim 1 and the one proposed by Dietz lies in the fact that the one proposed by in the present application is based on reciprocity. This

occurs by application of a monopole source at a receiver location, computing the surface oscillation at the body, i.e. the source, and deducing the Wave Transfer Vector from the reciprocity principle (i.e. the receiver becomes the source and the source the receiver). In the Dietz' Patent, in col. 4 lines 55-64 the methodology is based on a direct computation, (by application of a normalized current to the gradient coil). The difference between direct and reciprocal calculation methods is described in the present application with respect to figures 1-4 compared to figure 5 and associated text.

The reciprocity is applied in the present invention to the computation of the transfer vectors. Dietz discusses calculating a transfer function whereas claim 1 refers to a wave transfer vector. As explained in the present invention the wave transfer vector may be compared to an array of transfer functions and not just a single transfer function. Thus the level of complexity of the present application is much greater than that of Dietz.

Reciprocity has not been used in the Dietz patent since the transfer function computed is only between one input load (the gradient coil current) and one output response (the pressure at a specific points). Dietz attempts to model the usual situation that there is a source of noise and it should be measured at a relevant reference point, e.g. the ear of a listener. As far as the ATVs are concerned, the present invention uses more input points (nodes on the FEM or BEM model) than output points or receiver location (response points, typically ears of a driver of a car or some limited points around the source to evaluate acoustic power...). In the present invention application of reciprocity brings a very significant speed-up in terms of computation effort.

Claims 5-6

Dietz computes the transfer functions in the time domain and performs a Fourier transform. The different frequencies mentioned by Dietz are the fundamental and subsequent harmonics of the Fast Fourier Transform. Dietz does not refer to master and slave frequencies as recited in the present application and claims.

Claim 7

Dietz discloses the modal coordinate system for the vibration computation but in any case for the transfer function computation. The use of Modal Acoustic Transfer Vector is well suited for multi-load case and optimization procedure. The usage of modal coordinate system to compute the intermediate vibrations as disclosed by Dietz is not well suited to such applications.

Claims 13

Dietz does not refer to wave energy source from a monopole source leading to surface vibration and deducing the Wave Transfer Vector from the reciprocity principle. Dietz refers to input gradient coil current that induces part vibrations that results in noise propagation - this a direct calculation method not one using reciprocity.

Claims 14-15

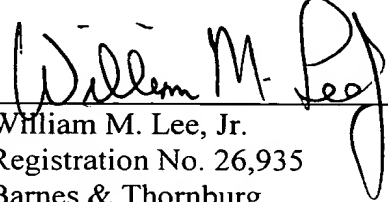
The frequencies referred to in the Dietz Patent are the fundamental of the Fourier Transform (f_G) and the subsequent harmonics ($n f_G$). The master frequencies in the present patent application correspond to a selected set of frequencies where the Transfer Vectors are computed whereas the slaves frequencies are frequencies at which the Transfer Vectors are interpolated. See Figures 6 and 7 and the associated text.

Given the above, it is submitted that the invention, as claimed and as the terminology is defined, is distinguishable from and allowable over Dietz and the remaining prior art. The examiner's further and favorable reconsideration in that regard is therefore urged.

As this response is being sent during the fifth month following the examiner's office action, an appropriate petition for extension of time is also submitted herewith.

June 30, 2004

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "William M. Lee, Jr.", is written over a horizontal line. The signature is stylized with a large, looped "L" and a prominent "P" at the end.

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